(No Model.)

W. H. STEWART.

APPARATUS FOR THE MANUFACTURE OF PIPES.

No. 467,648. Patented Jan. 26, 1892.

Fig. 1

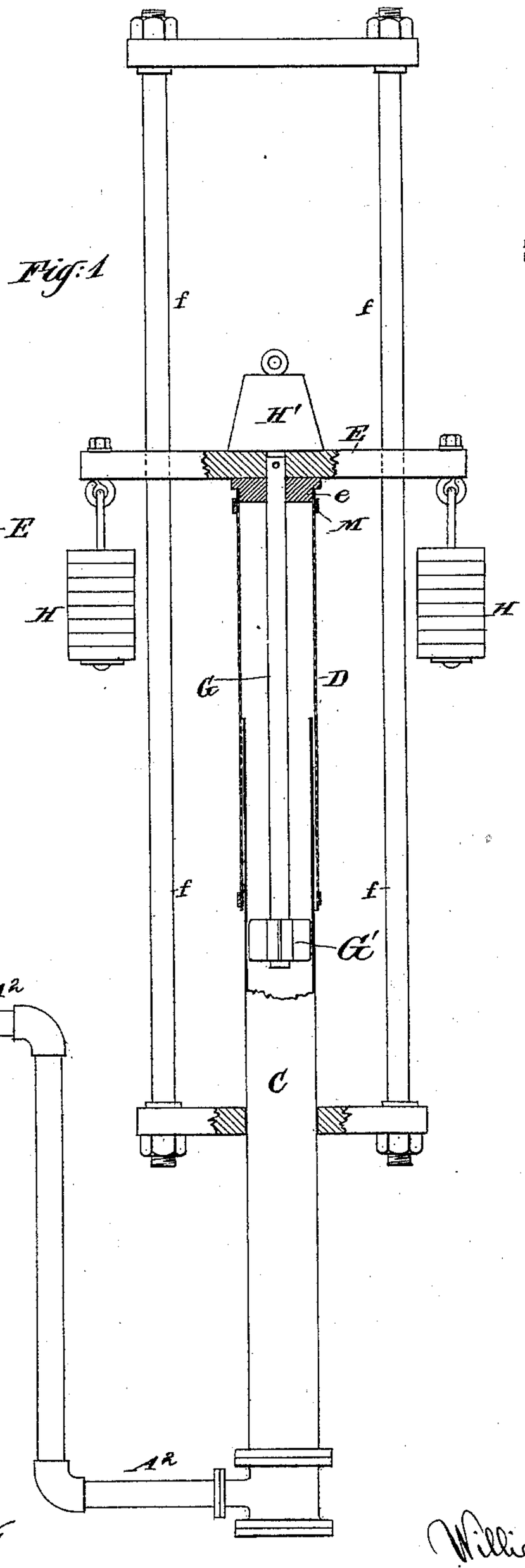


Fig. 2.

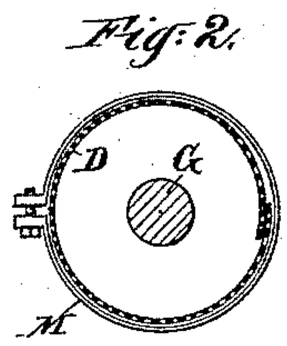
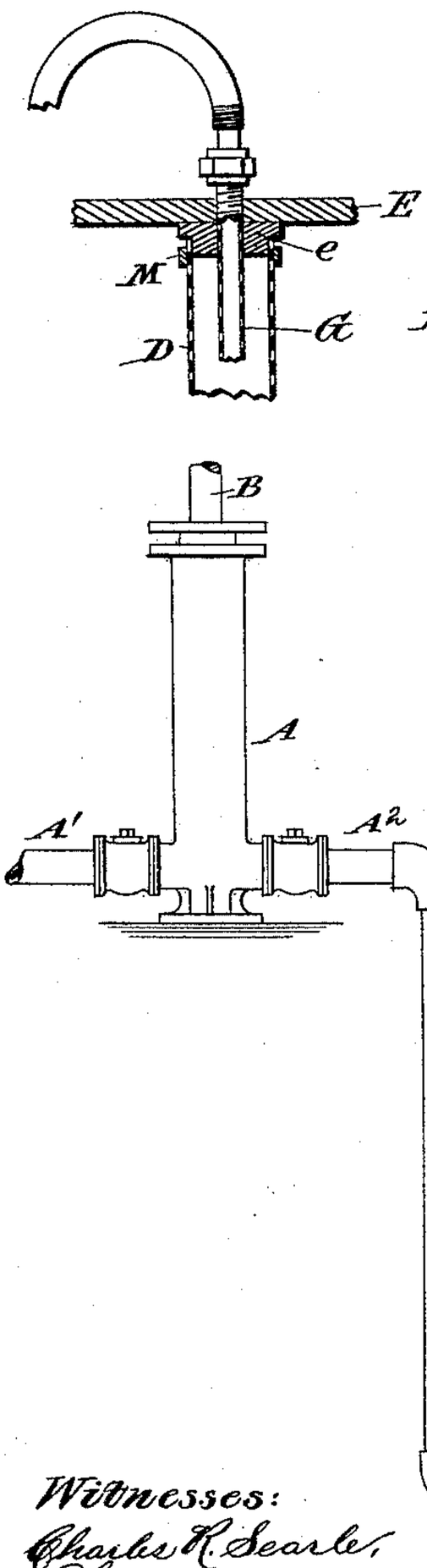


Fig. 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE MANUFACTURE OF PIPES.

SPECIFICATION forming part of Letters Patent No. 467,648, dated January 26, 1892.

Application filed June 19, 1890. Serial No. 356,011. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. STEWART, a citizen of the United States, residing in the city of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Apparatus for the Manufacture of Pipes; and I do hereby declare that the following is a full and exact description thereof.

Half-stuff and other forms of paper-pulp capable of being worked as a liquid or semi-liquid may be wrought into the desired form and consistence by being compressed into a suitable perforated mold by the direct action of a pump, the water being allowed to escape through the finely-perforated surfaces while the solid material is retained. The continued action of the pump adding more and more of the pulp at one point or at more points in a proper length of the covering will produce properly hardened, light, strong, and non-conducting coverings of the required form, adapted to serve for the purpose intended more perfectly than any before known to me.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is an elevation, partly in section, showing the apparatus in the act of forming the pipes. The remaining figures are on a larger scale. Fig. 2 is a horizontal section through the mold. Fig. 3 is a central vertical section showing a modification.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

A is a pump operated by the reciprocations of a plunger B, and receiving through a pipe A′ thin paper-pulp from a tank, (not shown,) in which it is kept agitated, and delivering the same under pressure through a pipe A^2, which latter leads into the base of an upright pipe C, of brass or other suitable material, highly polished, with its upper end open.

D is a finely-perforated mold or pipe, temporarily fixed on an offset *e* on a cross-head E, which latter is guided by upright rods *f f*, and is bored to allow the insertion and removal of a cylindrical rod G, which latter performs the important function of molding the interior of the length of pipe which is to be formed. The perforated tube D molds the exterior of the pipe. Both are capable of being readily attached to the cross-head and of being also readily detached therefrom.

H H are weights attached, respectively, to the ends of the cross-head E.

H′ is a removable weight set on the center of the cross-head E.

The mold or pipe D is made of a sheet of perforated metal formed into a hollow cylinder, with its edges overlapped and held by clamps M, or it may be made in two halves, if desired, and be held together by clips or other equivalents of the clamps.

In operating the invention the pump forces the liquid pulp upward through the pipe C. The liquid portion flows out at the upper end thereof and escapes radially through the minute perforations in the inclosing mold or pipe D, falling idly outside and being allowed to flow away. The liquid escaping from my apparatus may under some conditions carry fine fiber. This may be recovered by using the same water again to manufacture other pulp. On commencing the cross-head E is in its lowest position, with the offset *e* resting on the upper edge of the pipe C. The pulp forced into the pipe C presses upward on the surface of the cross-head E within the area of the pipe D, and when it has become sufficient to lift these parts it uncovers the interior of a portion of the pipe D. As soon as the water escaping through this portion has left a sufficiently dense coating of this fiber on the interior of the pipe D to greatly retard the escape of the thin pulp the pressure due to the pump will lift the cross-head E and its connections farther and farther, each time exposing a fresh portion immediately above the top of pipe C. The largest portion of the water escapes along this level; but the pressure being maintained a portion traverses more slightly through the particles of pulp already molded above, leaving its fiber to fill the interstices there. Thus the work proceeds, the cross-heads and its attachments successively lifting as the pump forces the thin fluid in, either continuously or at short intervals. Any ordinary or suitable force-pump may be em-

ployed. The working portions of the pipes or tubes C D are considerably longer than the lengths of pipe which are to be molded. When the cross-head E has been forced upward from its resting-place on the upper edge of the pipe C and has molded within the perforated pipe or cylindrical mold D a pipe somewhat in excess of the length to be made, the pump is stopped and the cross-head and its connections farther hoisted by a lever or other convenient means. (Not shown.) I remove the length of pipe which has been formed from the offset *e*, drawing it downward and bringing with it the perforated mold D, which molds the exterior, and also the smooth rod G, which molds the interior. This latter is allowed to remain in the length of pipe and maintain the proper size and smooth condition of the cavity until the pipe has been dried. When the machine has stopped, the cross-head E and its connections are raised so as to bring the lower end of the rod G above the top of the pipe C, in which position the mold D and its contents may be detached from the offset on the cross-head E by simply pulling downward thereon. In this movement the rod G is detached from the cross-head E and remains in the interior of the newly-formed length of pipe. Either now while the stock is green or at a later stage after it is dry I saw off or otherwise remove a portion of the soft pulp last formed. The remainder is dried with the central rod G in place, and then the rod G is removed. This mode of working requires a large number of the rods G for one set of the other parts of the apparatus. When a length of the newly-formed pipe has been removed, a fresh rod G is introduced in the cross-head and forced down until its upper end is nearly flush with the upper face of cross-head E. Now the cross-head E and its perforated mold D and its solid interior or core G are lowered again into place, the rod G being within and the perforated pipe D without the open-ended pipe C, and the operation is repeated.

The lower end of the rod G is guided in the pipe C by wings G′, which act against the interior of the pipe C and hold said rod and pipe exactly concentric with each other.

The chief use to which I propose to apply the pipe thus made is to serve as a covering for other pipes, on steam-pipes to retain heat, or on brine-pipes in refrigerating to defend against heat. To facilitate this I provide for easily applying and securing it on such other pipes of proper size. After a length of my pipe is molded and preferably before it is much dried a sufficiently-wide strip of cheap muslin or other suitable flexible material is glued or otherwise cemented onto the exterior, extending continuously from one end to the other of the short length of pipe. Now this latter is treated by a circular saw, allowing the saw to enter on the side opposite to the center line of the muslin and allowing the cut to extend nearly through. The two halves of the pipe thus formed are easily opened or adjusted apart to fit on a steam-pipe. After it is in place it is closed together and held firmly by double-pointed tacks or other suitable devices.

The density to which the pulp will be compressed in the lengths of pipe manufactured by my apparatus depends largely on the force with which the thin pulp is urged by the pump. Assuming the pump to be worked with sufficient power, the force or pressure exerted on the pulp varies with the resistance. I can make the resistance greater or less at any time by varying the weights on the cross-head. The central weight H′ may be removed and replaced at pleasure; so, also, may the weights H. I can use the weights H H alone or the central weight H′ alone.

I can use a perforated tube of proper size in place of the rod G for molding the interior of my pipe-covering. In such case the water can escape from the pulp not only outwardly through the mold D, but also inwardly. Provision should be made in such case for leading away the water from the top of the hollow tube which takes the place of the central rod G. Fig. 3 shows such modification.

I can, if preferred in any case, make the stationary pipe C larger instead of smaller than the perforated mold D, and fit it on the outside instead of the inside of the mold. In such case the perforated mold will rise slowly within instead of outside of the pipe C as the pulp continues to be forced into it. The action will be very nearly the same as when the perforated mold is on the outside, with the difference that there is not room for a set of retaining-clamps to apply outside of the perforated mold D. My experiments indicate that such may be dispensed with and that the mold D being made in an elastic coil held together by a proper clamp at the upper end will be forced outward by the pressure aided by its own slight elasticity and rise in contact with the interior of the pipe C, molding the pipe very successfully. I prefer the arrangement first shown.

I have in my experiments made the perforated mold D by bending around a plane sheet of finely-perforated brass, allowing the edges to considerably overlap, and holding it in position by retaining-clamps. This construction facilitates the removal of the mold; but I can use a complete tube made of proper strength and remove the contents by forcing them endwise by suitable mechanism.

The temporary connection of the tube D to the offset *e* on the cross-head may be by screw-threads, in which case it will be required to be revolved or partially revolved to effect the connection and disconnection; but my experiments indicate that a sufficient connection can be made by simply thrusting the smooth-ended pipe or mold upon a smooth offset of corresponding size and allowing the parts to be retained by friction. They are submitted to no severe strain. When it is

desired to separate them, it may be easily effected either with or without first slackening the clamp M.

I claim as my invention—

1. In an apparatus for molding pipes, the perforated mold D and central core G, in combination with each other and with the stand-pipe C, pump A, and weighted movable cross-head E, substantially as herein set forth.

2. In an apparatus for manufacturing pipes from pulp, the combination, with chamber or tube C and a connection A^2, bringing the semi-fluid material under pressure into such tube, of a pervious tube D of larger size closely fitted and sliding thereon and formed in sections adapted to be readily opened for removing the molded pipe, all substantially as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, in the presence of two subscribing witnesses.

W. H. STEWART.

Witnesses:

THOMAS DREW STETSON,

CHAS. S. BARBER.